10/052,517
In re BRUZY et al.

IN THE CLAIMS

1. (amended) Method for controlling a flap-actuator stepper motor provided for actuating a flap of a motor-vehicle air-conditioning installation, the stepper motor is controlled by a controlling unit, the method comprising the steps of:

actuating the stepper motor;

delivering to the stepper motor a power-supply voltage at a drive frequency in response to an actuation command;

continuously gathering an information representing torque requirements for torque delivered by the stepper motor in order to shift the flap;

supplying the control unit with the information representing the torque requirements; and

reducing the drive frequency of the power-supply voltage in response to a detected increase in the torque requirements; and

increasing the drive frequency of the power-supply voltage in response to a detected reduction in the torque requirements when the drive frequency is below a predetermined maximum frequency,

wherein the drive frequency is made to vary in steps, the move from one step to another being ordered in response to the crossing of a threshold by the detected-torque requirements.

2. (previously amended) Method according to Claim 1, wherein in response to the actuation command, the operation of the stepper motor is initially ordered at the predetermined maximum frequency.

3. (previously amended) Method according to Claim 1, wherein the drive frequency is made to vary in a near-continuous way as a function of fluctuations in the detected-torque requirements.

4. (amended) Method according to Claim 1, wherein the step of varying the drive frequency is made to vary in steps, the move from one step to another step to a third step being ordered in response to the crossing of a second threshold by the detected-torque requirements.

5. (previously amended) Method according to Claim 1, wherein the motor is fed in over-powered mode.

6. (previously amended) Method according to Claim 1, wherein the information is gathered representing the torque requirements by detecting a quantity representative of the instantaneous torque delivered by the motor.

7. (previously amended) Flap actuator for a motor-vehicle air-conditioning installation, the flap actuator comprising:

a stepper motor (112) for driving a flap,

an electrical power-supply circuit (104) for the motor,

a control input (102) and a control unit (100) linked to the control input and to the electrical power-supply circuit (104) for delivering to the stepper motor (112) a power-supply voltage at a given frequency in response to an actuation command received on the control input (102), and

a first means (120) for supplying the control unit (100) with information representing torque requirements which the motor (112) has to deliver in order to shift the flap, wherein

the control unit (100) comprises a second means for adapting the drive frequency of the stepper motor on the basis of the information representing the torque requirements, and

a third means for reducing the drive frequency if the torque requirement exceeds a first threshold and increasing the drive frequency if the torque requirement becomes lower than a second threshold,

wherein the drive frequency is made to vary in steps, the move from one step to another being ordered in response to the crossing of said first threshold by the detected-torque requirements.

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8. (previously amended) Actuator according to Claim 7, wherein the control unit (100)
further comprises a <u>forth</u> means for reducing the drive frequency in response to a detected
increase in the torque requirements and ~~a means~~ for increasing the drive frequency in response
to a detected reduction in the torque requirements when the drive frequency is below a
predetermined maximum frequency acting in response to the reception of the information
representing the torque requirements.

9. (previously amended) Motor-vehicle air-conditioning installation, wherein the
installation comprises at least one actuator according to Claim 7.